

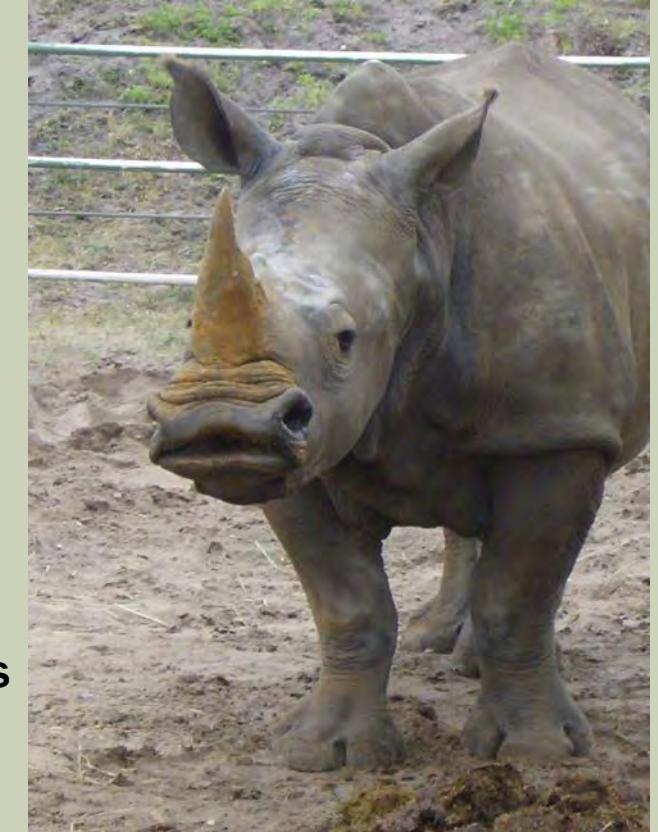
“PORCINE ZONA PELLUCIDA IMMUNOCONTRACEPTION OF SOUTHERN WHITE RHINOCEROS IN MANAGED CARE.”



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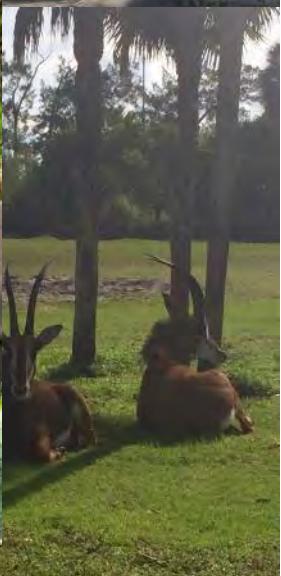
POPULATION HISTORY & CURRENT STATUS OF SOUTHERN WHITE RHINO IN NORTH AMERICA

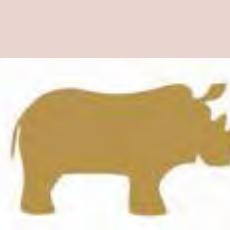
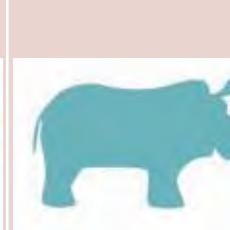
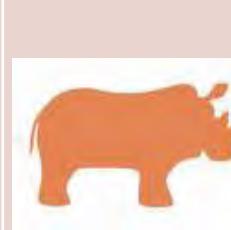
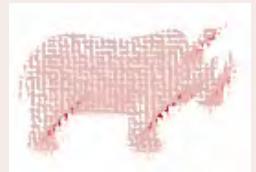
- Consistently held in North America since 1962.
- Population Growth of 197 individuals (July 2014)
- Breeding Population of 162 (69.93) individuals
 - Success in breeding groups of 3 or more females per male.
- 45 AZA Institutions & 5 non-AZA Institution
 - Population would decline if managed only within AZA
 - Only 5-6 institutions in N.A. have had consistently successfully breeding/births
- Limited space housing future zoo-born offspring!
 - A small percentage of the population at a limited number of institutions is currently producing the majority of births in N.A. & when these institutions are unable to place offspring at other facilities they restrict their breeding efforts, which reduces the overall birth rate of the population.





- The founders were 1.2 Southern White Rhinos imported from Kruger National Park, S.A. in 2001.
- Today we house 1.4 adults
 - Fed Timothy hay & free choice of grass on habitat (no
 - Habitat
 - 26 acres (10.5 hect
 - Train & tour trucks



2001 Come to BG	2004	2006	2007	2008	2009	2010	2012	2015
Mielani					Nov. 2009			
								
Kisiri						Aug. 2010		Coming Soon!
								
		For 6 year Kisiri was flatline.				July 2010		
		Lucy						
					Musumba			1.6 successful birth since 2004!

DECISION TO USE CONTRACEPTION

- August of 2010, 1.7 white rhinos
 - In addition we had 2.0 white rhinos & 2.1 black rhinos, for a grand total of 13 rhinos for the rhino team staff of 6.
 - Musumba's introductions to our bull, Tambo, were unfavorable & there was limited space to move either of them.
 - Delays in finding placements for our ever growing crash
- PZP Vaccinate 3 out of 4 of our breeding females to decrease surplus animal production.
 - 1) Melani (wild)- 4 calves in 5 years
 - Anemia, parasites, & nursing a calf
 - Give her a break
 - 2) Lucy- bloodline is over represented
 - 3) Musumba- bloodline is over represented
 - Lucy & Musumba have the same father who has sired numerous calves.
 - 4) Kisiri (wild)- did NOT contracept due to her previous flatline status

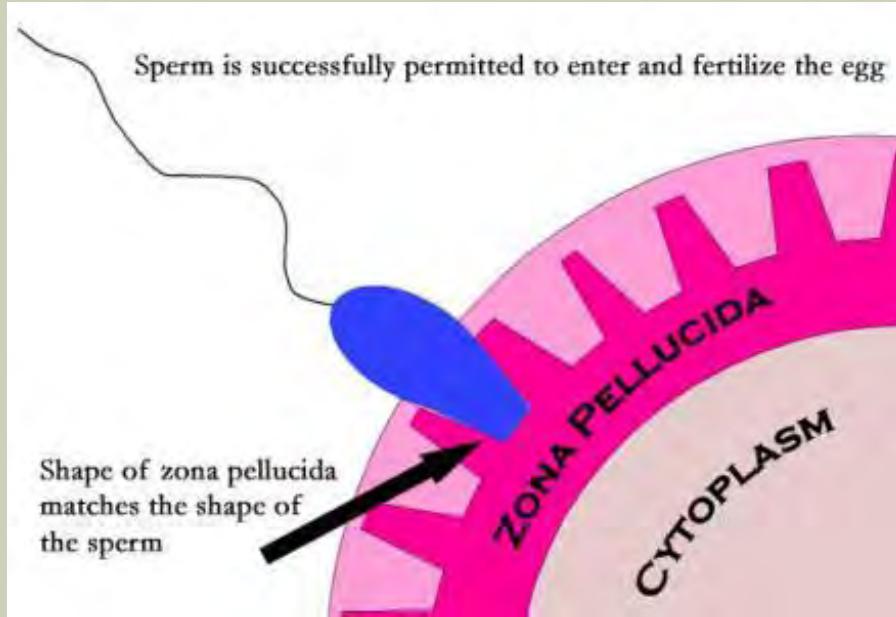


WHAT IS PZP?

- Zona pellucida (ZP) is a non-cellular glycoprotein membrane that surrounds all mammalian eggs. Certain proteins in the membrane serve as the sperm receptor.
- Produced by a complex process whereby the ZP from a pig is removed from the ovum, its glycoproteins extracted, isolated, & converted into a vaccine.
- Vaccine stimulates the target animal to produce antibodies, which attach to its own ZP, thus blocking fertilization & causing contraception.
- Manufactured by Dr. Jay Kirkpatrick, at the Science & Conservation Center, Zoo Montana, USA
 - www.sccpzp.org

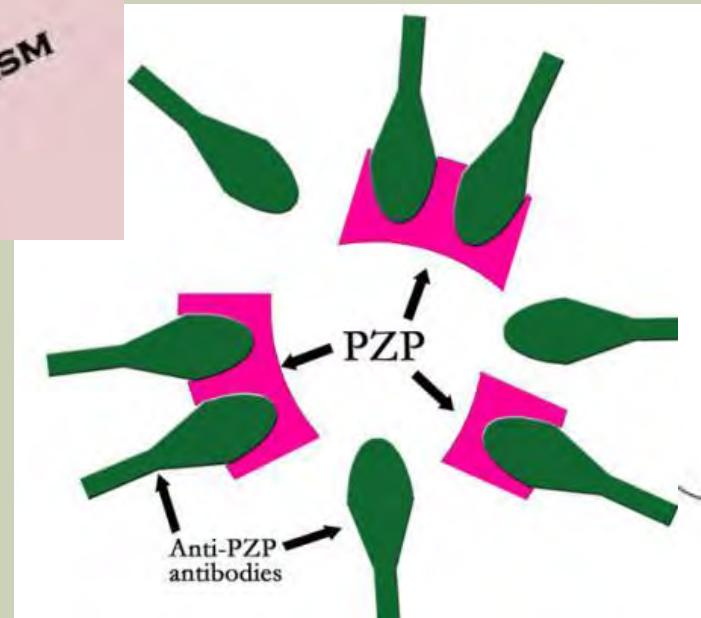


Natural Fertilization

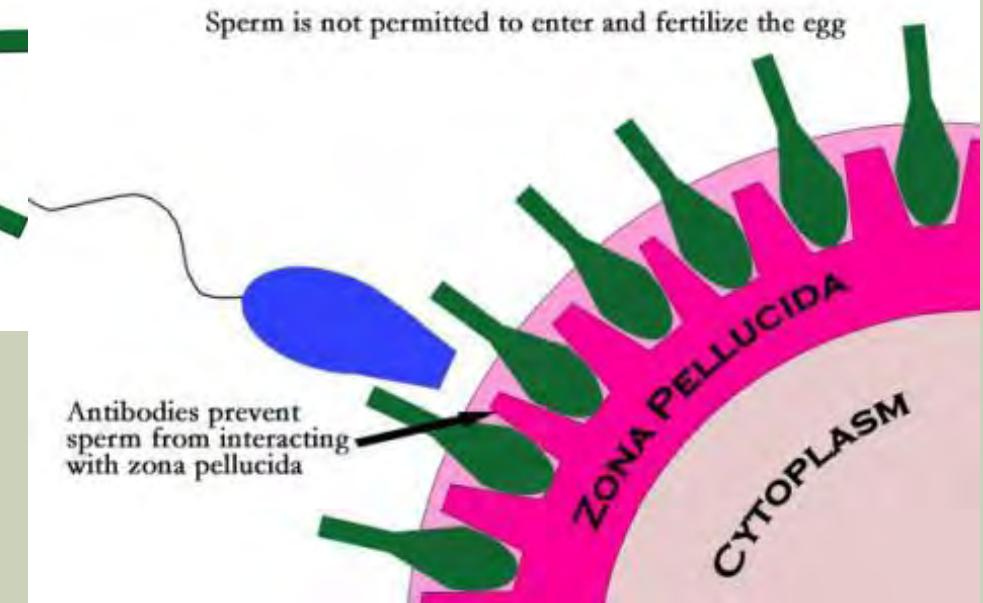


How PZP Works...

Add PZP Vaccine



No Fertilization



HOW IS PZP ADMINISTERED?

- PZP vaccine is given intramuscular injection (IM), in a series of three vaccinations three weeks apart & then a booster, 1 year later.
- PZP is not effective until after at least 2 injections
 - Intervals are species dependent
 - Timing of booster inoculation is species dependent
 - Must be a minimum 2 weeks after the last injection before the male is placed with the female
- No known contraindications (interactions with other drugs)



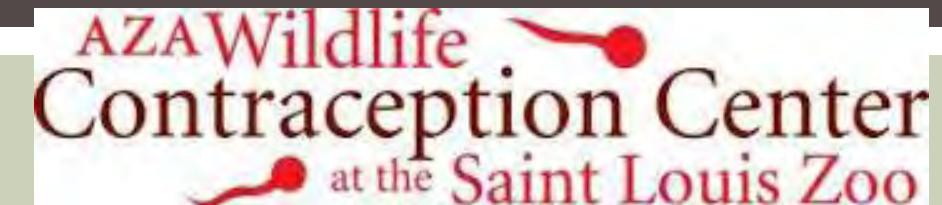
WHAT SPECIES HAVE BEEN PZP VACCINATED?

- In the wild...

- Wild horses, donkey, Prezewalskii's horse, Grevy zebra, plains zebra, mountain zebra, tapir, elephant, & the black rhino.
 - Treated pre-pubertal white-tailed deer & feral horses were fertile as adults, but there is no data for other species
 - To the best of our knowledge & research PZP has only been used on post reproductive rhinoceroses.
- African Elephants
 - To eliminate culling, the PZP vaccine has been tested in the Kruger National Park.
 - Successful & the results have paralleled those of horse contraception.
 - No changes in the social behaviors of family groups or harassment of cycling females by bulls.



WHAT SPECIES HAVE BEEN PZP VACCINATED CONTINUED...



- Zoo Animals
 - Prevent the production of "surplus" animals
 - >112 species of zoo animals in >100 zoos have been treated with PZP.
 - Affecting >40 of these species
 - PZP has proven to contracept just about all mammalian species, except in some carnivores
 - Ex. it works in bears but not in felids & canids.
 - PZP vaccine is now a standard recommendation for many species by the Contraceptive Advisory Group of the American Zoo & Aquarium Association (AZA).
 - Recommended for ungulates, pinnipeds, elephants & bears
 - Short-term use, up to 3-4 consecutive years
- Advantages
 - Longer-term use in animals not essential for breeding programs, because of the possibility of reversal failure following long-term use.
 - Individual animals who have a history of problematic pregnancy's.
 - Administered without the stresses of restrain

PZP SYNAPSIS

- Thus far PZP is a promising form of contraception
 - Not commercially available, but is provided at the cost of production, \$21 US/dose
 - Prevented pregnancy an average of 90% of the time in treated animals
 - Effective across many species
 - No debilitating health side-effects even after long-term use
 - Vaccine cannot pass through the food chain
 - Safe to give to pregnant animals
 - Delivered remotely by small darts
 - **Not recommended for rhinos!**
 - Contraceptive effects are reversible
 - **We hope!**
 - Almost no effects on social behaviors
 - **We have not seen any negative effects socially.**



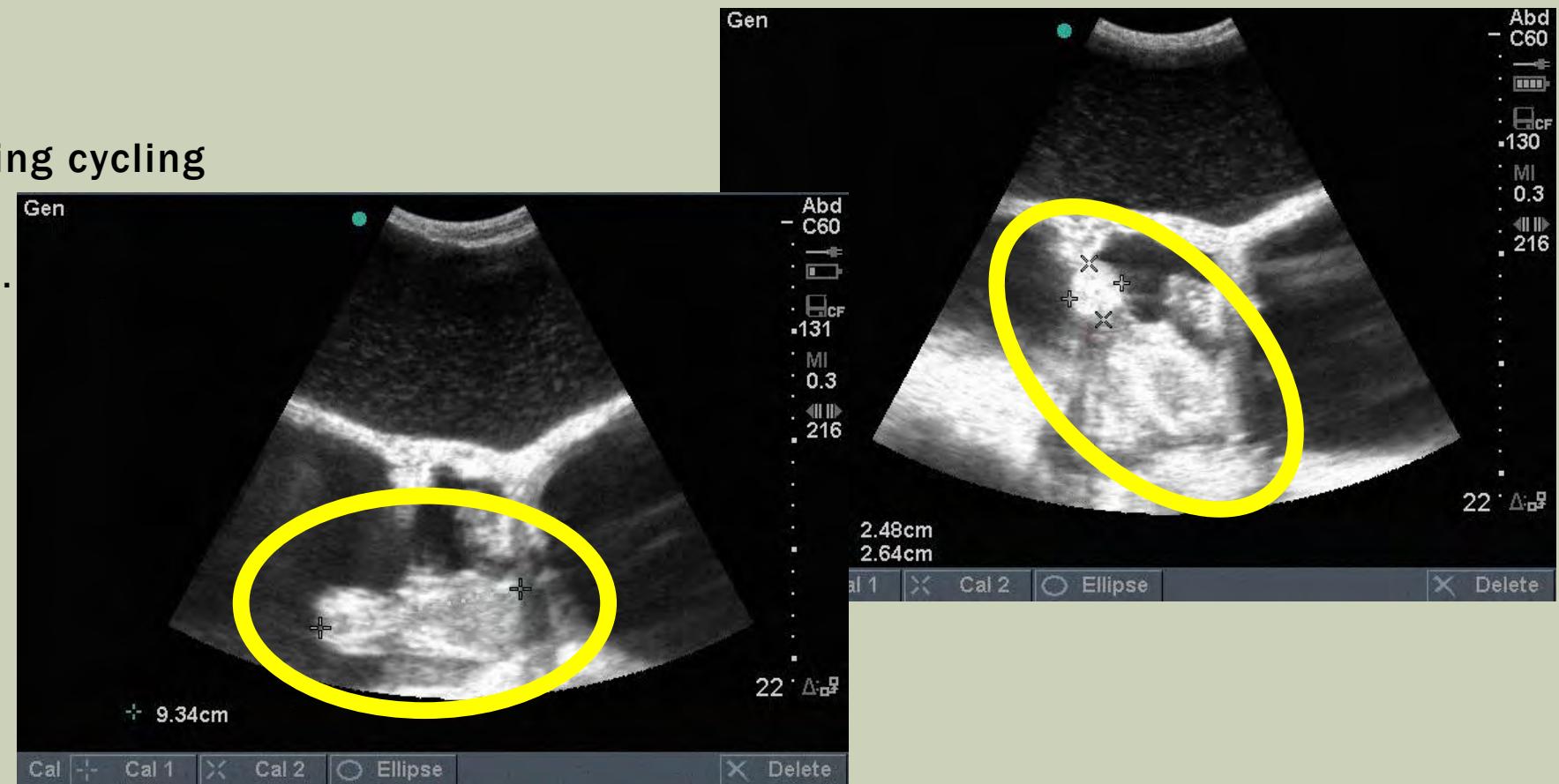
PZP ADMINISTERED

- December 2010 Mlelani, Musumba, & Lucy were given their 1st PZP injection
 - Dose: 100 ug intramuscular (IM)
 - The vaccine sites did result in a sterile abscess, which is not an uncommon side effect of PZP.
- January 2011- 2nd dose of PZP (21 days later)
- February 2011- 3rd dose PZP (45 days later)
- March 2012 ONLY Musumba & Lucy- booster
 - Mlelani was NOT given a booster, with the hopes of staggering the calf births in the future.
- Tambo (bull) was solitary October 2009-April 2011 & again August 2012-December 2012
 - 2009-2011- needed to “fill” an empty rhino exhibit & he was not “playing nice”
 - 2012- attempted to breed his daughter, who was 2.5 years old
- Tambo was breeding with all of the females on a fairly regular basis.



BEHAVIOR

- Ultrasounds
 - Finding follicles, corpus luteum (CL's), healthy ovaries, healthy uterus, etc.
- Breeding
- Collecting blood
 - Progesterone is showing cycling
- Kisiri's pregnancy
 - Due late Aug- early Sept.



FUTURE?

- Unfortunately, even with these positive signs of breeding behavior, there have been no new pregnancies from our vaccinated females.
 - Mlelani- 4.4 years since last vaccine injection
 - Lucy- 3.3 years since last vaccine injection
 - Musumba- 3.3 years since last vaccine injection
- Reminder
 - Duration of affect for PZP varies in each species & individuals
 - Not been commonly used on rhinos, so it is unknown of when the PZP will expire.
- Kisiri is reproductively sound & we have confidence that the rest of the females will return to normal reproductively as well.
- Possibly receiving a new female to “kick start” the vaccinated females &/or to have 2 reproductively viable females until the others are back on track.



BUT IF WE HAD A TIME MACHINE...



- More research...
- Would NOT have vaccinated Mlelani
 - Both Kisiri & Mlelani, our wild caught females
- Possibly would NOT have vaccinated Musumba
 - Simply because she has not had a pregnancy/calf yet.
- Probably still vaccinate Lucy
 - Genetics are overrepresented



WHAT TO DO WITH THIS INFORMATION?



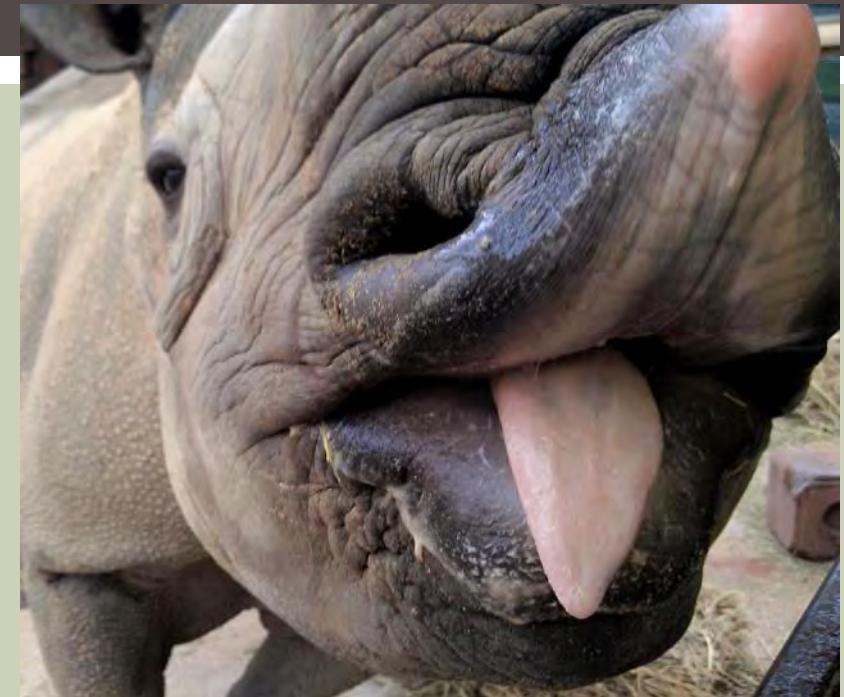
- Our story & our experience & we thought it was important to share it for anyone who may use PZP to manage their rhinos.
- Recommend...
 - Plan! Plan! Plan!
 - Research! Research! Research! (unbiased)
 - Understand the consequences!
 - Are there alternative methods?
 - Moving an individual
 - Separations?



SOMETHING TO THINK ABOUT...

- Should an endangered species be contracepted?
 - Especially with the severity of the poaching crisis?
 - We aren't sure of the affects of PZP on rhinos?
 - There is no book or reference on "*Rhino Contraception*"

- Who makes the decisions & on what basis?
 - Species Survival Plan Coordinator (SSP)? Rhino Taxon Advisory Group (TAG)? Curator? Veterinarian?



These are serious questions involving the ethics of both science & wildlife management & they must be considered before the application of this technology is applied to our wildlife resources.

Acknowledgements

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Questions?



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